

Exoplanet Spectroscopy

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A Survey of Molecules

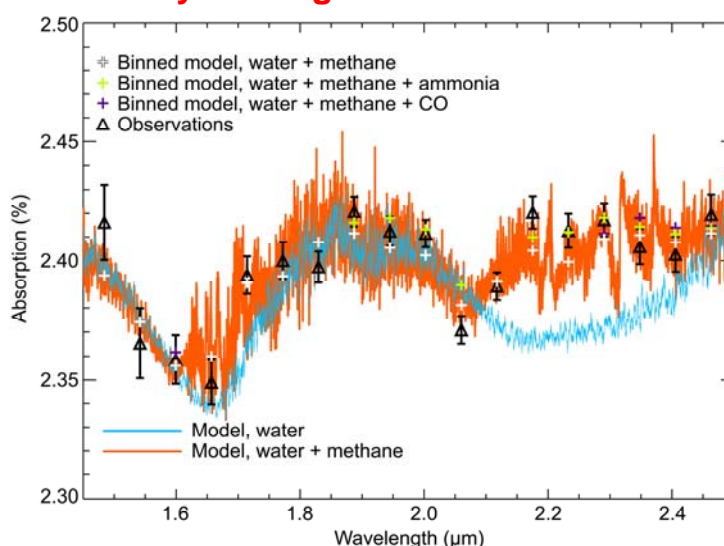
Immediate goal: Determine conditions, composition, and chemistry in exoplanet atmospheres using molecules as probes.

3 year goal: Detect prebiotic molecules on planets where life could exist.

Recent Results

- First detection of an organic molecule in an exoplanet atmosphere.
- First infrared spectrum resolving the absorption bands of water.
- Demonstration of Hubble IR spectroscopy for exoplanet characterization
- Demonstration of transmission spectrum with SNR = 10,000:1

Key Findings: Methane and Water



*This program is advancing rapidly and we expect to announce the detection of more molecules shortly. **An important aspect of this work is that it demonstrates that the HST/NICMOS combination has the sensitivity to detect prebiotic molecules on a habitable zone exoplanet orbiting a near-by M dwarf.***

Benefits to NASA and JPL (or significance of results)

This work enables new mission concepts for exoplanet characterization and for studying prebiotic conditions on habitable zone worlds. This work significantly advances the state of the art and decisively demonstrates that

Publications

Swain, Vasisht & Tinetti, "Methane present in an extrasolar planet atmosphere", Nature, accepted.

Swain, Bouwman, Akeson, Lawler & Beichman, "The mid-infrared spectrum of the transiting exoplanet HD 209458b", Astrophysical Journal, **674**, 482.